

Priestley Johnson Ltd		Page 1
Bank House 105-109 New St, Blackrod Bolton BL6 5AG	DINAS LANE LIVERPOOL	
Date 01/07/2021 File storage.MDX	Designed by SMJ Checked by	
Micro Drainage		Network 2018.1.1

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
1.000	21.000	0.140	150.0	0.089	4.00	0.0	0.600	[]	-4	Pipe/Conduit
2.000	15.000	0.150	100.0	0.030	4.00	0.0	0.600	o	150	Pipe/Conduit
3.000	15.000	0.150	100.0	0.037	4.00	0.0	0.600	o	150	Pipe/Conduit
1.001	10.000	0.067	149.3	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.13	49.225	0.089	0.0	0.0	0.0	2.61	4303.0	12.1
2.000	50.00	4.25	49.750	0.030	0.0	0.0	0.0	1.00	17.8	4.1
3.000	50.00	4.25	49.750	0.037	0.0	0.0	0.0	1.00	17.8	5.0
1.001	50.00	4.40	49.076	0.156	0.0	0.0	0.0	1.07	42.5	21.1

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Foul Sewage per hectare (l/s)	0.000
Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	40.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	5.000
Hot Start Level (mm)	0	Run Time (mins)	720
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	6
Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0		

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.800	Storm Duration (mins)	360
Ratio R	0.400		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: 4, DS/PN: 1.001, Volume (m³): 37.4

Unit Reference	MD-SHE-0111-5000-0650-5000
Design Head (m)	0.650
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	111
Invert Level (m)	49.076
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.650	5.0
Flush-Flo™	0.204	5.0
Kick-Flo®	0.457	4.3
Mean Flow over Head Range	-	4.2

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.8	1.200	6.7	3.000	10.2	7.000	15.3
0.200	5.0	1.400	7.1	3.500	11.0	7.500	15.8
0.300	4.9	1.600	7.6	4.000	11.7	8.000	16.4
0.400	4.6	1.800	8.0	4.500	12.4	8.500	16.9
0.500	4.4	2.000	8.5	5.000	13.1	9.000	17.4
0.600	4.8	2.200	8.8	5.500	13.7	9.500	17.9
0.800	5.5	2.400	9.2	6.000	14.2		
1.000	6.1	2.600	9.6	6.500	14.8		

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